

WORLD UTILITIES CONFERENCE MAY 2026 - ABSTRACT

**SMARTNET™ – RENEWABLES BASED TRANSPORT & ENERGY
INFRASTRUCTURE SYSTEM**

Current Renewable Generating Capacity in the UK – by way of example

The UK has made significant progress in renewable energy, particularly offshore wind. Here is a snapshot of the current generating capacity (as of recent reporting, typically 2024/2025):

Renewable Source	Current Capacity (Approx.)	Context
Wind (Total)	Over 30 GW	The largest renewable source.
Offshore Wind	Approx. 15 GW	The UK is a world leader in offshore wind, with enormous potential still to be developed in the North Sea.
Solar	Approx. 15 GW	Capacity is spread across large solar farms and domestic rooftop installations.
Bioenergy & Waste	Approx. 7 GW	Includes sustainable biomass and energy from waste facilities.
Hydro	Approx. 1.5 GW	Limited by geography, mainly focused in Scotland.

The capacity for renewables (especially wind) often exceeds national demand during periods of low usage, leading to the issue of **curtailment** (wasting power).

UK Renewable Capacity (2025 Snapshot)

Wind Power: Record output of 22,711 MW (22.7 GW) in November 2025, meeting 43.6% of national demand and powering ~22 million homes.

Quarterly Generation: Q3 2025 renewables produced 31.9 TWh, accounting for 51% of Britain’s total electricity.

Wind contributed 17.7 TWh, solar ~7 TWh, with hydro and biomass making up the rest.

Seasonal Records: In Q3 alone, renewables supplied 46–51% of the UK power mix, overtaking fossil fuels.

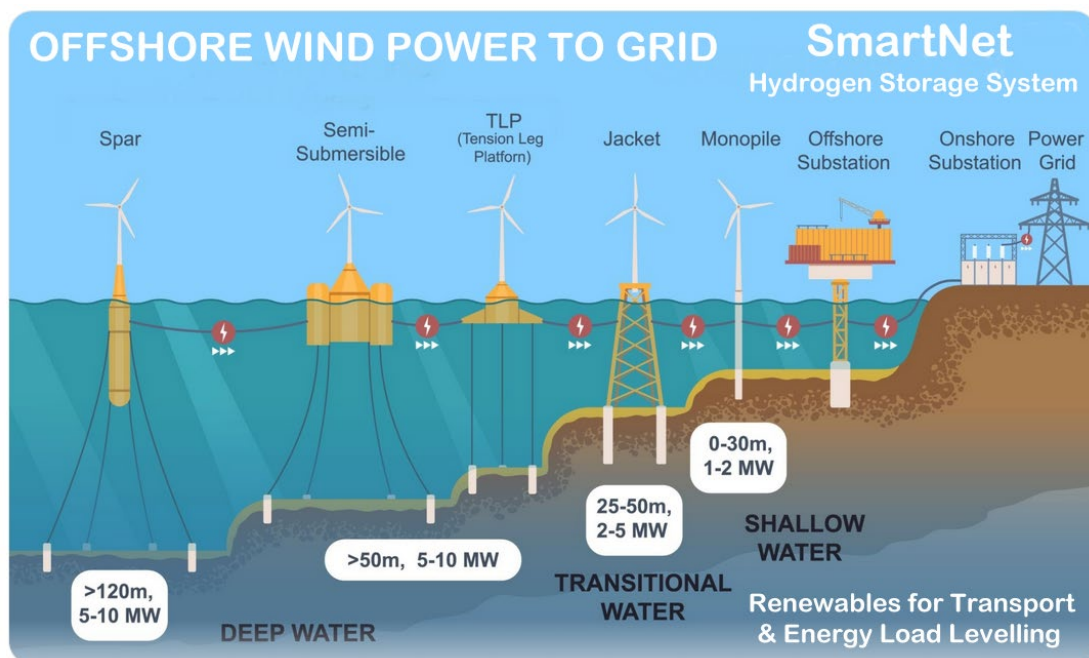
Milestone: By 2023, the UK had already produced its trillionth kWh of renewable electricity, enough to power homes for 12 years.

The Role of SmartNet in Sustainable Transport

A system like **SmartNet** is designed specifically to solve the core challenges of integrating variable renewable power into a transport system, making it possible to effectively replace petrol and diesel, without reliance on lithium and cobalt.

1. Harnessing Curtailed Renewable Energy

The crucial element is using renewable energy that would otherwise be wasted.



The Problem of Curtailment: When wind or solar generation is high and demand is low (e.g., windy nights), the National Grid must instruct wind farms to **curtail** (switch off) their generation to prevent grid instability or overload. This wasted energy is sometimes paid for by consumers.

The SmartNet™ Solution: Power-to-X: SmartNet stations, acting as local energy hubs, would be positioned to take this excess, low-cost electricity directly from the grid and use it for two purposes:

1. **Direct Battery Storage:** Charging the standardized battery cartridges (LB) or the hybrid cartridges (HB).

2. **Green Hydrogen Production:** Powering local **electrolysers** to split water and oxygen. This Green Hydrogen is the zero-emission fuel source that would replace diesel for long-haul transport. This effectively converts wasted renewable electricity into a storable, transportable, high-density fuel.

2. Achieving Zero-Emission Transport

By using only renewable energy, the resulting power from hydrogen is truly zero-emission:

- Battery Electric Vehicles (BEVs): Charged by the renewable power.
- Hydrogen Fuel Cell Electric Vehicles (FCEVs): Powered by the green hydrogen, which produces only water vapour as exhaust.

WHITE PAPER / THESIS OUTLINE: SmartNet for UK Transport Decarbonisation

The following outline focuses on the strategic deployment of the SmartNet system as an integrated energy and transport solution for the UK (by way of example).

Title: The Integrated Energy Cartridge: Leveraging Curtailed Renewables for a Decarbonised UK Transport Network via the SmartNet System

I. Executive Summary

Problem: Mismatch between variable renewable generation and fixed energy demand leading to curtailment, and the "chicken-and-egg" issue of zero-emission Heavy Goods Vehicle (HGV) infrastructure.

Solution: Deployment of a SmartNet-type network utilizing standardized, rapid-swap Energy Cartridges (Battery and Hydrogen) to integrate energy storage and transport fuel supply.

Thesis: SmartNet provides the necessary load-levelling capacity to stabilize the National Grid while creating a viable, scalable, zero-emission fuel pathway for HGVs and commercial fleets.

II. Context and Current UK Energy Challenges

A. Renewable Penetration & Curtailment: Current UK offshore wind and solar capacity, and the financial and environmental cost of wasted power.

B. Transport Decarbonisation Gap: The difficulty of replacing diesel in long-haul HGVs and high-use commercial fleets due to battery weight, charging time, and range requirements.

III. The SmartNet System: A Dual-Purpose Solution

A. Transport Efficiency via Standardisation:

Rapid Cartridge Exchange: 20-80 second swap time for standardized battery (LB) and hydrogen (HB) cartridges, solving the 'charging delay' bottleneck.

Future-Proofing: Standardized cartridges decouple the fuel source from the vehicle chassis. Providing 500 mile ranges in EV's and 700 mile ranges for trucks.

B. Load Levelling and Grid Efficiency:

Absorbing Excess Power: SmartNet stations act as large-scale, decentralized storage (virtual power plants) absorbing excess power during low-demand, high-wind periods.

Grid Stability: Releasing stored energy back into the grid during peak demand (load levelling), significantly reducing the need for costly and polluting gas-peaker plants, thereby increasing the National Grid's overall efficiency.

C. Green Hydrogen Production: The use of cheap, off-peak renewable power to generate Green Hydrogen via on-site electrolysis, ensuring the resulting transport fuel has zero upstream emissions.

IV. Implementation and Adoption in the UK

A. Phased Deployment: Focus on deploying the first SmartNet hubs along major arterial routes (M1, M6, etc.) to serve commercial distribution hubs.

B. Regulatory Framework: Proposal for government incentives (e.g., tax breaks, guaranteed off-take contracts for hydrogen) to drive early adoption and private sector investment.

C. Standards: Need for a cross-industry council (Government, Grid Operators, Vehicle Manufacturers) to define the Energy Cartridge Standard and ensure interoperability.

POTENTIAL IMPACT (UK Context)

Renewable Capacity: Wind output exceeded 22.7 GW in 2025, enough for 22 million homes.

Curtailment Losses: Billions of kWh wasted annually due to grid constraints.

SmartNet Utilization: Redirecting just 20% of curtailed wind could power millions of EVs annually.

V. International Adoption and Cooperation

A. Global Need for Standardization:

The success of SmartNet hinges on a global standard for the energy cartridges, similar to global shipping containers.

B. Cooperation with Car and Truck Makers:

Incentivising Design: Governments and consortia must collaborate with major truck (e.g., Daimler, Volvo) and car makers to design vehicle chassis built to accept the standardized SmartNet cartridges. This requires long-term commitment. The problem is not so acute for trucks and larger vans, where they have twin-rail chassis frames, onto which a SmartNet system may simply bolt to.

Hydrogen vs. Battery Neutrality: A standardized platform allows OEMs to invest in either FCEV or BEV technologies without locking fleets into one infrastructure. Changing from one energy storage technology to another is possible at the flick of a switch.

C. Government and Inter-Governmental Collaboration:

Nationwide adoption could eliminate transport's reliance on petrol/diesel, cutting CO₂ and particulate emissions by tens of millions of tonnes.

Proposal for a "Global Transport Decarbonisation Treaty" focused on common infrastructure standards, accelerating the replacement of diesel globally and allowing for seamless, zero-emission international freight transport. In the process, saving oil reserves for future generations, and reducing global warming.